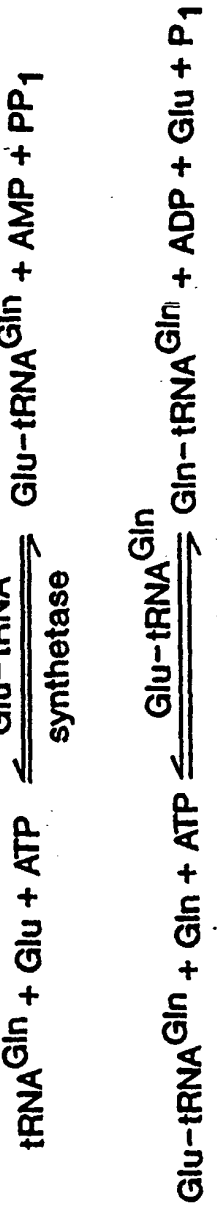
tRNA^{Gln} + Glu + ATP ⇐ Glu-tRNA synthetase ⇒ Glu-tRNA^{Gln} + AMP + PP$_i$
Glu-tRNA^{Gln} + Gln + ATP ⇐ Glu-tRNA^{Gln} ⇒ Gln-tRNA^{Gln} + ADP + Glu + P$_i$
amidotransferase

FIG. 1

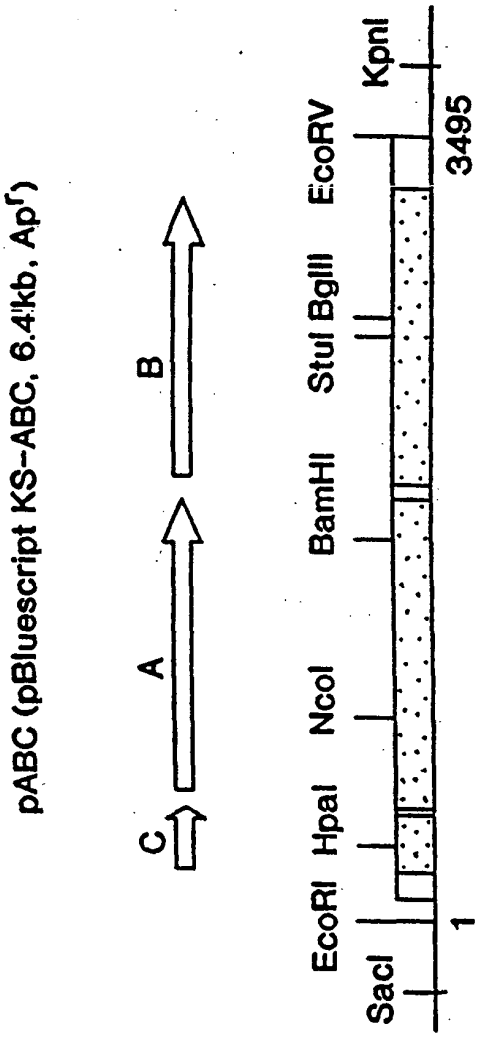
pABC (pBluescript KS-ABC, 6.4kb, Ap^r)
A
B
C
EcoRI HpaI NcoI BamHI StuI BglII EcoRV KpnI
SacI
1
3495

FIG. 2

FIGURE 3A

```
        1
1       GAATTCGATC  CTGTCTCAAG  GCGTTTTGTT  GCTTTAAAGG  GCTTGTTTTT
          (EcoRI)

51      GATATGATCA  GTATTATATG  ACTTAACGGA  GAAATATGTG  GAGGTGGATC
          C
          START→
101     ATATGTCACG  AATTTCAATA  GAAGAAGTAA  AGCACGTTGC  GCACCTTGCA

151     AGACTTGCGA  TTACTGAAGA  AGAAGCAAAA  ATGTTCACTG  AACAGCTCGA

201     CAGTATCATT  TCATTTGCCG  AGGAGCTTAA  TGAGGTTAAC  ACAGACAATG

251     TGGAGCCTAC  AACTCACGTG  CTGAAAATGA  AAAATGTCAT  GAGAGAAGAT

301     GAAGCGGGTA  AAGGTCTTCC  GGTTGAGGAT  GTCATGAAAA  ATGCGCCTGA

351     CCATAAAGAC  GGCTATATTC  GTGTGCCATC  AATTCTGGAC  TAAAGGAGGG
            A
            START→
401     ACACAAGAAT  GTCATTATTT  GATCATAAAA  TCACAGAATT  AAAACAGCTC

451     ATACATAAAA  AAGAGATTAA  GATTTCTGAT  CTGGTTGATG  AATCTTATAA

501     ACGCATCCAA  GCGGTTGATG  ATAAGGTACA  AGCCTTTTTG  GCATTAGATG

551     AAGAAAGACG  CGCGGCATAC  GCGAAGGAGC  TTGATGAGGC  GGTTGACGGC

601     CGTTCTGAGC  ACGGTCTTCT  TTTCGGTATG  CCGATCGGCG  TAAAAGATAA

651     TATCGTAACA  AAAGGGCTGC  GCACAACATG  CTCCAGCAAA  ATTCTCGAAA

701     ACTTTGATCC  GATTTACGAT  GCTACTGTCG  TTCAGCGCCT  TCAAGACGCT

751     GAAGCGGTCA  CAATCGGAAA  ACTGAACATG  GACGAATTCG  CCATGGGGTC

801     ATCTACAGAA  AACTCAGCTT  ACAAGCTGAC  GAAAAACCCT  TGGAACCTGG

851     ATACAGTTCC  CGGCGGTTCA  AGCGGCGGAT  CTGCAGCTGC  GGTTGCTGCG

901     GGAGAAGTTC  CGTTTTCTCT  TGGATCTGAC  ACAGGCGGCT  CCATCCGTCA

951     GCCGGCATCT  TTCTGCGGCG  TTGTCGGATT  AAAACCTACA  TACGGACGTG

1001    TATCTCGTTA  CGGCCTGGTC  GCATTTGCGT  CTTCATTGGA  CCAAATCGGA

1051    CCGATTACAC  GTACGGTTGA  GGATAACGCG  TTTTTACTTC  AAGCGATTTC

1101    CGGCGTAGAC  AAAATGGACT  CTACGAGTGC  AAATGTGGAC  GTGCCTGATT

1151    TTCTTTCTTC  ATTAACTGGC  GACATCAAAG  GACTGAAAAT  CGCCGTTCCG

1201    AAAGAATACC  TTGGTGAAGG  TGTCGGCAAA  GAAGCGAGAG  AATCTGTCTT

1251    GGCAGCGCTG  AAAGTCCTTG  AAGGTCTCGG  CGCTACATGG  GAAGAAGTGT

1301    CTCTTCCGCA  CAGTAAATAC  GCGCTTGCGA  CATATTACCT  GCTGTCATCT
```

FIGURE 3B

```
1351  TCTGAAGCGT  CAGCGAACCT  TGCACGCTTT  GACGGCATCC  GCTACGGCTA
1401  CCGCACAGAC  AACGCGGATA  ACCTGATCGA  CCTTTACAAG  CAAACGCGCG
1451  CTGAAGGTTT  CGGAAATGAA  GTCAAACGCC  GCATCATGCT  CGGAACGTTT
1501  GCTTTAAGCT  CAGGCTACTA  CGATGCGTAC  TACAAAAAAG  CGCAAAAAGT
1551  GCGTACGTTG  ATTAAGAAGG  ATTTCGAGGA  CGTATTTGAA  AAATATGATG
1601  TTATTGTTGG  ACCGACTACA  CCGACACCTG  CGTTTAAAAT  CGGTGAAAAC
1651  ACGAAGGATC  CGCTCACAAT  GTACGCAAAC  GATATCTTAA  CGATTCCGGT
1701  CAACCTTGCG  GCGTACCGGG  AATCAGGTGC  CATGCGGTTA  GCAGACGGAC
1751  TTCCGCTCGG  CCTGCAAATC  ATCGGAAAAC  ACTTTGATGA  AGCACTGTAT
1801  ACCGCGTTGC  TCATGCATTT  GAACAAGCAA  CAGACCATCA  TAAAGCAAAA
                              B
                          START→
1851  CCTGAACTGT  AAGGGGTGAA  AAGAATTGAA  CTTTGAAACG  GTAATCGGAC
1901  TTGAAGTCCA  CGTTGAGTTA  AAAACAAAAT  CAAAAATTTT  CTCAAGCTCT
1951  CCAACGCCAT  TCGGCGCGGA  GGCGAATACG  CAGACAAGCG  TTATTGACCT
2001  CGGATATCCG  GGCGTCCTGC  CTGTTCTGAA  CAAAGAAGCC  GTTGAATTCG
2051  CAATGAAAGC  CGCTATGGCG  CTCAACTGTG  AGATCGCAAC  GGATACGAAG
2101  TTTGACCGCA  AAAACTATTT  CTATCCTGAC  AACCCGAAAG  CGTATCAGAT
2151  TTCTCAATTT  GATAAGCCAA  TCGGCGAAAA  CGGCTGGATC  GAAATTGAAG
2201  TCGGCGGCAA  AACAAAACGC  ATCGGCATCA  CGCGCCTTCA  TCTTGAAGAG
2251  GATGCCGGAA  AACTGACGCA  TACGGGCGAC  GGCTATTCTC  TTGTTGACTT
2301  CAACCGTCAA  GGAACGCCGC  TTGTTGAGTN  CGTATCAGAG  CCGGACATCC
2351  GCACGCCGGA  AGAANCGTAC  GCATATCTTG  AAAAGCTGAA  ATCCATCATC
2401  CAATATACAG  GCGTTTCTGA  CTGTAAAATG  GAAGAAGGCT  CACTTCGCTG
2451  TGACGCCAAT  ATCTCTCTTC  GTCCGATCGG  CCAAGAGGAA  TTCGGCACAA
2501  AAACAGAATT  GAAAAACTTG  AACTCCTTTG  CGTTTGTTCA  AAAAGGCCTT
2551  GAGCATGAAG  AAAAACGCCA  GGAGCAGGTT  CTTCTTTCCG  GCTTCTTCAT
2601  CCAGCAAGAA  ACTCGCCGTT  ATGATGAAGC  AACGAAGAAA  ACCATTCTTA
2651  TGCGTGTCAA  AGAGGGATCT  GACGACTACC  GTTACTTCCC  AGAGCCAGAT
```

FIGURE 3C

2701	CTAGTCGAGC	TCTACATTGA	TGATGAATGG	AAGGAACGCG	TAAAAGCAAG
2751	CATTCCTGAG	CTTCCGGATG	AGCGCCGCAA	GCGTTATATC	GAAGAGCTTG
2801	GCTTCGCTGC	ATATGACGCA	ATGGTTCTGA	CGCTGACAAA	AGAAATGGCT
2851	GATTTCTTCG	AAGAAACCGT	TCAAAAAGGC	GCTGAAGCTA	AACAAGCGTC
2901	TAACTGGCTG	ATGGGTGAAG	TGTCAGCTTA	CCTAAACGCA	GAACAAAAAG
2951	AGCTTGCCGA	TGTTGCCCTG	ACACCTGAAG	GCCTTGCCGG	CATGATCAAA
3001	TTGATTGAAA	AAGGAACCAT	TTCTTCTAAG	ATCGCGAAGA	AAGTGTTTAA
3051	AGAATTGATT	GAAAAAGGCG	GCGACGCTGA	GAAGATTGTG	AAAGAGAAAG
3101	GCCTTGTTCA	GATTTCTGAC	GAAGGCGTGC	TTCTGAAGCT	TGTCACTGAG
3151	GCGCTTGACA	ACAATCCTCA	ATCAATCGAA	GACTTTAAAA	ACGGAAAAGA
3201	CCGCGCGATC	GGCTTCCTAG	TCGGACAGAT	TATGAAAGCG	TCCAAAGGAC
3251	AAGCCAACCC	GCCGATGGTC	AACAAAATTC	TGCTTGAAGA	AATTAAAAAA
3301	CGCTAATAAA	AAAGCAGCCC	TTAGAGGCTG	CTTTTTTTAT	GGTCAAATTG
3351	AGATAAAGAC	AAGATGAGGG	CCCGAAGCCT	TTCAACTTCT	TTGTCGTTGG
3401	TTCCGGCCAA	ATTGGACAGC	ATGCCTTTAT	AATCGGCTTG	CGCGGTTTAT
3451	CCTGAGTCAA	TTCTTCCTCG	ATAAGATAAG	TGACACGGTG	ATATC (3495)

(EcoRV)